

REPORT FOR THE MONTH OF MARCH 1961

Seventy-five giant kelp plants were transplanted from Turtle Bay, Baja, California, to the artificial reefs in Santa Monica Bay in an attempt to establish this temperature resistant strain in southern California. All the plants were adults with mature fruiting fronds. A successful seeding will probably establish this kelp.

Inspection in Japan of Pacific oyster seed was completed and the shipment was due in California at the end of the month.

Party boat fishing for salmon was good in February. Almost 5,500 were landed compared to 500 in February, 1960.

Storms prevented abalone fishing after the season opened March 16, and continued to curtail trawling.

Crab fishing in the San Francisco area continued at low level of return for effort expended.

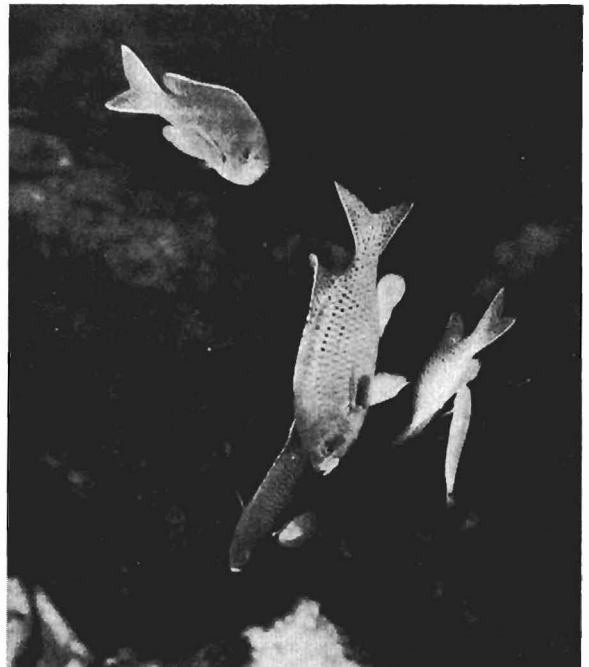
A 17-inch male halibut was recaptured after 399 days at liberty. It moved about 10 miles and grew about 1 inch.

The Shell Oil Company detonated 1629 charges of explosives (56,005 pounds) between Monterey Bay and Point Reyes. Ten of these charges killed 453 fish, mostly rockfish, jacksmelt and saltwater perch.

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PHOTO HIGHLIGHTS FOR MARCH 1961

Diver-biologists recently visited a fish delousing station at Santa Catalina Island and were able to photograph a senorita removing parasites from some blacksmiths. All fish checking in to these delousing stations adhere to two basic rules or they're not welcome back: everyone awaits his turn and nobody eats the station attendant.



Jane Solaro, Senior Stenographer at CSFL, resigned early in March after eight years with the Department. The stroller was the staff's gift at her retirement party.



1. BOTTOMFISH

- A. Flatfish: Stormy weather continuing with the vernal equinox has resulted in reduced trawl landings all along the California coast. This lull in landings and sampling thereof has given the staff time for paper work. Projects worked on include a summary of the Monterey Bay trawl fishery, preparation for Pacific Marine Fisheries Commission staff meeting, and final checking of a savings gear paper prior to submission to P.M.F.C. Project personnel spent one day aboard a halibut (Paralichthys) trawler from Santa Barbara observing catches. Fair landings of English sole were made late in March at Santa Barbara and Morro Bay with much of the fish trucked to San Francisco for processing.
- B. Rockfish: Frozen specimens of rockfish, taken during last month's cruise on the N.B. SCOFIELD, were processed. Proportional measurements, meristic counts, scales and otoliths were taken for comparisons of species.

2. SHELLFISH

- A. Abalone: The abalone season opened March 16 but due to exceptionally heavy seas the commercial fleet has been forced to remain in port. The large waves and the lack of suitable low tides prevented practically all shoreside sport fishing for abalone.
- B. Crab: The NAUTILUS trawled for crabs in the vicinity of Stinson Beach and off Fort Funston from March 2 through 11. This is the first of a ten-day-per-month offshore study to provide age and growth information. Weather and sea conditions allowed sampling at 34 stations in depths of 6 to 18 fathoms.

Landings in the north coastal area continue to better the catches of previous months this season. No prolonged periods of bad weather hampered the activities of the fleet. The price structure continued at 16 cents per pound at Eureka and 25 cents at San Francisco.

The San Francisco crab fishery is very poor, and experienced crab fishermen say it has no parallel in their recent memory. Observation of gear at sea indicates that fishing activity is widely dispersed, with fewer boats and traps employed from Point Reyes south than during recent seasons.

- C. Oysters and Clams: Marine Biologist W. Dahlstrom completed his inspection of Pacific oyster seed in Japan. The shipment is due in Eureka about March 28 where part of the seed will be unloaded for planting in Humboldt Bay. The vessel will continue to San Francisco, arriving approximately April 3, to discharge the remainder.

Humboldt Bay oyster production is at a high level although not as great as last year at this time.

- D. Shrimp: A pre-season exploratory shrimp cruise aboard the N.B. SCOFIELD began March 13 and is to continue through April 25. Rough weather prevented the planned fishing at Avila, so the vessel proceeded to

Bodega Bay where shrimp beds off the mouth of the Russian River are being explored. Preliminary results indicate that shrimp in this area are small and not present in commercial quantities this early in the season.

3. PELAGIC FISH

- A. Sardines: San Pedro market landings totaled 136 tons through 25 March. The cannery season is closed.

The ALASKA returned to San Pedro 25 March after completing a 20-day trip in Mexican waters. The prime objectives of the cruise were: (1) To sample spawning sardines to determine what relationship exists between the springs spawners off southern California and Baja California and the genetically distinct groups which have been defined as "northern" and "southern" stocks. (2) To transport live kelp from Turtle Bay to southern California in conjunction with the Ocean Fish Habitat Project (see section 5D of this report).

Sardines were scarce with no adults collected or observed. Anchovies were abundant (about 250 schools) between Ensenada and Blanca Bay. Jack and Pacific mackerel were abundant in Turtle Bay. Persistent NW winds hampered operations considerably throughout the cruise.

Aging of all 1960 sardine and anchovy bait samples was completed. Progress was made on reading scales taken as part of the morphometric studies and on those taken during the commercial season.

- B. Mackerel: Fresh fish market landings consisted of 43 tons of Pacific and 136 of jack mackerel through 25 March. Cannery landings were light with only a few hundred tons brought in. The price paid to the fishermen for mackerel was raised from \$35 per ton to \$42.50 per ton and cannery limits were increased from 20 to 40 tons. Poor weather and sea conditions coupled with a scarcity of mackerel on local fishing grounds kept most of the net boats dock-side.

- C. Anchovies: Small anchovies were abundant in southern California with Los Angeles and Orange county bait boats active throughout the month. Live bait sampling continued at Santa Monica, Malibu, and Los Angeles Harbor.

A four day aerial survey flight from San Diego to Bolinas Bay, California revealed more inshore anchovy schools than on any flight since October 1958. Over 1000 schools were counted, all south of Santa Barbara, with the heaviest concentrations off Port Hueneme and Oceanside.

San Pedro market landings totaled 82 tons through 25 March.

4. TUNA

Most of the month was devoted to summary and analysis of data in preparation for publication.

- A. Albacore: A manuscript describing the results of the 1960 pre-season albacore research cruise is almost completed and will be submitted shortly. This paper includes a discussion of the albacore catch and some of the major oceanic features in the area.

A summation of all data concerning albacore food habits was started, in preparation for analysis and publication.

- B. Bluefin: Work was initiated this month on a paper: A synopsis of biological data on Pacific Ocean bluefin tuna for the FAO World Tuna Conference.
- C. Miscellaneous: New methods of observing agglutination in erythrocyte ghost cells were examined for studies in reproductive isolation of tunas as well as related species.

5. SPORTFISH

- A. Party Boat: Salmon fishing appears to be changing for the better. Almost 5500 fish were landed in February as compared to 500 in February 1960.

Rockfish have contributed well over 100,000 fish to party boat anglers so far in 1961. Bonito, following its greatest year on record, has contributed almost 50,000 fish. Kelp bass and barracuda lag well behind with 15,000 and 11,000 fish respectively.

A California halibut tagged and released at the mouth of the Santa Ana River on February 4, 1960, was recaptured by a party-boat skipper 10 miles northwest of the release point on March 10, 1961. The fish, a 17-inch male, grew approximately one inch during its 399 days of liberty.

Initial sorting and classifying of the large collection of colored slides began following the delivery of a fine file cabinet through the offices of the Los Angeles County Fish and Game Commission.

- B. Northern California Marine Sport Fish Survey (DJ F12R7): Bottom fish catches were very poor at most ports but at two, Monterey and Morro Bay, the catches remained good. Salmon fishing dropped considerably from the previous month in Monterey Bay and off San Francisco. Better-than-average catches of lingcod were reported from the deeper water areas off Santa Cruz. These fish are small 8-10 pound individuals.

Compilation and analysis of project data was continued throughout the month.

Results of the skindiving sampling were presented by Miller at the Pacific Fisheries Biologist meeting at Harrison Hot Springs on March 22. A letter was sent to skindiving club presidents to obtain data on club members. When these data are received the skindiving analysis will be completed.

Miller attended a meeting of the Central-Council of Skindiving Clubs at Santa Rosa on March 18. He asked all divers present to start compiling data needed concerning number of diving days expended throughout the year.

The authors' proof of a Field Guide to Some Common Ocean Fishes of California, Part II, was checked and sent back to the editor.

- C. Barracuda and White Seabass Management Study (DJ F16R4): Barracuda catches by the sportfishing party boats increased moderately over February at most of the active southern California ports. Between four and five thousand fish were reported by Long Beach-Los Angeles Harbor boats alone. There were no reports of commercial barracuda activity this month.

White seabass landings were at their usual low for this period. Morro Bay party operators reported catching a dozen fish, while the waters off Long Beach-Los Angeles Harbor yielded only 35.

Market sampling at San Pedro and Morro Bay revealed moderate to fair catches of white seabass by commercial fishermen. One commercial man reported a 2,000-pound load for a three-day trip. General unsettled weather (wind) from mid-month on caused cessation of fishing along the southern California coast. Scattered shipments (via truck) of white seabass from Baja California throughout the month reflected the general scarcity of fish from local sources.

Eleven white seabass were collected with a sampling gill net off Belmont Shore, Long Beach early in the month. The data gathered will be used in calculating the weight-length relationship as well as for age determinations and food habit studies.

Additional sampling efforts were delayed because the only available boat required repairs and alterations.

Project personnel mounted over 500 barracuda and white seabass scales for age determinations.

Some progress was made on a paper describing barracuda and white seabass exploratory fishing.

- D. Ocean Fish Habitat Development (DJ F17R4): Wind and dirty water curtailed diving surveys in Santa Monica Bay. Only the reefs at Malibu and Hermosa Beach were visited. Quarry rock and concrete shelters continue to attract the most fish. The giant kelp transplanted from Paradise Cove to the Malibu reef, last month, appeared to be surviving. Several plants were lost due to tie-down lines rotting. The use of nylon lines should prevent this in the future.

Project personnel traveled to Turtle Bay, Baja California from March 18-21, to obtain living giant kelp plants to transplant into Santa Monica Bay. This hardier variety of giant kelp exhibits resistance to warm and cool waters, and we are seeking a satisfactory

method to transplant it into southern California. A total of 37 sacks containing about 75 plants was brought back. Eight sacks were flown back on the Department's Twin Beechcraft, and tied onto the Hermosa Beach reef. An additional 29 sacks were brought back in the bait wells of the ALASKA. These plants were placed on the Paradise Cove reef in an existing kelp bed, on the Malibu reef near the recently transplanted kelp from Paradise Cove and on the Hermosa Beach reef alongside the plants flown in by airplane. All the plants are protected from grazers by net webbing. The net sack was opened at the top only enough to allow the longer (30-40 foot) stipes to float naturally in the water. Cork floats were attached to the nets to compensate for any lack of buoyancy due to implosion of the pneumatocysts.

It is hoped that young plants will become established even if the original adults die. All the plants used appeared to be mature and had fruiting fronds.

Richfield Oil island and car body reef -- Rincon: Only four fishes, one kelp bass, one sand bass and two perch, were observed on the new car body reef. This low count was undoubtedly due to the dirty water.

Roughly half of the Richfield island was surveyed and over 2700 fishes observed. As usual, perch formed better than 50 percent, with kelp and sand bass accounting for 23 percent. Many young perch and rockfish, including bocaccio, blue rockfish and olive rockfish, were noted. One female kelp rockfish, 13 inches long, was speared. A study of the ovaries showed the eggs were nearing maturity and that the larvae probably would have been released within a few days.

Standard-Humble oil platforms - Summerland: Due to stormy weather and rough water the towers were not visited.

6. SPECIAL PROJECTS

- A. Southern California: The Shell Oil Company conducted seismic operations between Monterey Bay and Point Reyes from March 4 to 9 and from March 16 to 23. A total of 1,629 shots (56,005 pounds of explosives) resulted in ten observed kills totalling 453 fish. The largest kill, 302 fish, occurred in 16 fathoms of water off Santa Cruz on March 20 and included 200 black rockfish, 10 vermillion rockfish, 50 pile perch, 20 rubberlip perch, 20 rainbow seaperch and two rare fish, a pigmy rockfish and a red brotula. The other nine kills had a total of 111 jacksmelt and 40 surfsmelt.

One day, March 23, was spent observing a "Seismic Gun". This is a 30 foot length of pipe which generates a shock wave by burning a mixture of propane and compressed air. Because of the slow burning rate of the mixture (compared to explosives) the gun almost certainly will not kill fish. About 1100 "shots" were observed with no indication of damage to fish life. A detailed report was submitted.

One day, March 1, was spent in San Diego assisting Harold Bissell,

Marine Resources Branch, collecting samples as part of a radiological monitoring program for San Diego Bay.

Five hundred questionnaires designed to assess the skin divers catch of black sea bass were prepared and sent to the Greater Los Angeles Council of Skin Divers for distribution to their member clubs and those of other Councils.

Four days were spent in San Diego interviewing fishermen and collecting data as part of a limited study of the fishery of Mission Bay. The 206 fishermen interviewed had fished 580 hours and had taken 155 fish, principally spotfin croaker, California halibut and spotted bass. Of the total of 94 spotfin croaker, 76 weighing up to $4\frac{1}{2}$ pounds were taken by 31 successful fishermen March 25 and 26. One four-pound California halibut was taken on March 26.

- B. Northern California: On 24 February a field trip was made to the Bodega Bay area to look over the proposed site for a nuclear reactor of Pacific Gas and Electric Company on Bodega Head. Present were Dr. Walter A. Chipman of the U.S. Fish and Wildlife Service, Mr. Robert Hollis and Mr. Carol Coffey, engineers of the California Public Utilities Commission, and J. A. Aplin. The party visited the Pacific Marine Station where Dr. Chipman had an extended discussion with Dr. Joel Hedgepeth, director of the station, on possible effects of the proposed power plant on the biota of the area.

Aplin spent one day supervising and assisting Mr. Irwin Haydock on the oyster drill control experiment in Tomales Bay. Seven hundred pounds of year old oysters were removed from Elkhorn Slough to the experimental plots. The drill control study is being conducted by the Pacific Marine Station under contract with the Department.

On 6 March freshly shucked oysters were weighed at the plant of the El Morro Oyster Company. The results are to be used in converting oyster landings in the round to shucked weight.

The motion pictures of oyster seed production taken in Japan in 1960 by Aplin were edited and are available for showing at the MRO training session in April.

Water temperature data were obtained from logs of two San Francisco steamship companies. These records were sent to the Tuna Investigation by the Public Utilities Commission.

7. BIOLOGICAL NOTES

The Huntington Beach Steam-Generating Plant (Southern California Edison Company) applied heat treatment to their intake system from 10:pm till after 2:am the night of March 11. More than two tons of fish were netted and otherwise removed from the system. The great bulk of these, perhaps 95 percent by weight, were queenfish. All but three of the other kinds of fish killed had been noted during heat treatment at other steam plants in the past. The three not

previously noted were sheephead (including two 20-to 25-pounders), garibaldi, and salema. At this plant, the dead fish are removed by a series of lift screens (revolving screens are used at other plants). It was obvious from the start that the lift screens were inadequate and they gave nothing but trouble; however, the basket into which the dead fish were flushed was even less efficient. A great many dead fish flowed over the top of the basket and were carried into the discharge pipe which empties into the ocean. In view of this situation, it was surprising we were not deluged with calls the next day regarding dead fish on the beach.

Among the rare and unusual fish received this month were a 3-foot wolf-eel from off Long Beach (unusual in southern California), a 2-foot long snake-eel from Huntington Beach (also unusual in southern California), a 12-inch red brotula from Monterey Bay and a 4-inch pygmy rockfish from the same place (both rare).

Most of the editing this month centered around the Salton Sea report which will be submitted as a Fish Bulletin. In addition to this, a short manuscript on tuna was sent to the editor of CALIFORNIA FISH AND GAME, a longer manuscript on trawl-mesh experiments was given a final typing before being used in a PMFC Bulletin, 4 cruise and flight reports were processed, and several items were returned to their respective authors for additional work.

8. BIOSTATISTICS

A. Data Processing

Regular Reports:

February 1961 Processors Reports and Cannery Reports were completed. The monthly tuna letter was prepared and mailed.

Annual Processors Reports were completed preparatory to publication of the 1960 Statistical Circular.

Marine Sport Catch Reports for February 1961 were completed for the party boat fleet and the summary letter mailed to interested parties.

Special Reports:

Northern California crab landings for December 1960 and January 1961 were sent to H.G. Orcutt.

The 1960 commercial salmon report was completed and distributed, and a marine sport catch report recording by port and month was transmitted to Salmon Investigation.

A special report on species other than California halibut taken by selected halibut boats was prepared for Mr. Roedel for legislative purposes.

Field:

The field man spent the month working in the Biometrical Analysis unit.

One trip was made to San Francisco to discuss work with Zoie McAlister, new employee, hired to process biostatistical field material in the Region 3 office. Mrs. McAlister spent one week in training at Terminal Island. Ed Greenhood spent one day at Stanford discussing mink food problems.

B. Technical Assistance and Biometrical Analysis

Manual Computation:

Calculation of estimated numbers of Pacific mackerel at ages 1 and 2, and of the bias and variance of the estimates, was done for November and December 1960 data.

Computer Programs:

Tables for fitting the von Bertalanffy growth curve by least squares were run on the Western Data Processing Center 709 computer. Arrangements for printing the tables were made so as to facilitate photographing them for publication. Considerable time during the remainder of the month was spent in completing the text to accompany the tables.

Statistical and Mathematical Analysis:

Work continued on comparison of several statistical estimators of weights and numbers of king and silver salmon in the commercial catch. The estimators are being compared as to relative size of variance and bias, with sample data collected by the Salmon Investigation.

Work is being done in an attempt to revise the method of estimating relative fishing powers of albacore vessels so as to permit the estimation of the variance of the estimated fishing powers.

9. RESEARCH VESSELS

ALASKA

The vessel conducted three weeks of Pelagic Fish studies off the coast of central and northern Baja California (cruise 61-A-2), together with kelp transplanting and transplanting operation for the Habitat Development Project.

N. B. SCOFIELD

In the middle of the month the N. B. SCOFIELD sailed for central and northern California waters to conduct ocean shrimp studies. She engaged in this activity the balance of the month (cruise 61-S-2).

NAUTILUS

The vessel arrived in San Francisco Bay the first of the month. From the first through the twelfth she was engaged in crab studies off San Francisco and Bodega Bays.

From the thirteenth through the seventeenth she engaged in gear preparation and handling, for the forthcoming salmon recovery program in Carquinez Straits.

MOLLUSK

The vessel was transferred to San Pedro, and has been secured for the entire month. She will probably not be used again until the summer abalone survey.

10. LIBRARY

A. General:

Organization of an accumulation of Russian fisheries journals has been the major library project for the past month. High school groups seeking material for science fairs and term papers have made heavy use of reference materials. Preparation of books for the bindery continues as time permits. New publications received totaled 520.

11. MISCELLANEOUS

A. Meetings and Talks:

- Mar. 2 - Radovich attended a Marine Research Committee meeting in San Francisco.
- Mar. 2 - Hyatt talked to the Lakewood Rotary Club on MRO activities. About fifty people were in attendance.
- Mar. 3 - Roedel attended a San Diego meeting of the Small Boat Harbor Subcommittee of the State Chamber of Commerce.
- Mar. 3-10 - Greenhood attended Sacramento meetings of the Salary Committee.
- Mar. 3 - Aplin met with Mr. Burton Tooker and other members of the State Lands Commission staff in Los Angeles to discuss ownership of state tidelands, in particular those of Elkhorn Slough where title is not clear. This matter will require legal decisions by the Attorney General's office, State Lands Commission, and property owners. Active herring spawning in the area near the present outfall has occurred the last two years. Mussels and other sessile marine life live within a few hundred feet of the present outlet, indicating a relatively harmless effluent.

- Mar. 6 - Orcutt represented Marine Resources Operations at meeting with Pacific Gas and Electric Company engineers to discuss design of Morro Bay steam plant in relation to its affect on marine fish and shellfish in the area.
- Mar. 7 - Aplin attended a meeting held at the offices of the Kaiser Chemical plant at Moss Landing to discuss relocation of their outfall line. They plan to move this outlet from the bay to the open shore where dispersion of the col-loidal waste will be better.
- Mar. 7 - Roedel attended and spoke briefly at a dinner given by Pierpoint Landing, Long Beach, for the Los Angeles area press. Pierpoint will have three deluxe party boats in operation by early summer; the purpose of the dinner was to unveil their plans officially.
- Mar. 7 - Turner spoke to a group of 35-40 Los Angeles County diving instructors at their meeting in Bell Gardens.
- Mar. 7 - Baxter, Captain Putman and Warden Decker met with Mayor Stoddard of Newport Beach and members of the Corona Del Mar Chamber of Commerce to discuss a proposed marine life refuge in that area.
- Mar. 8 - R. H. Rowland, Greater Los Angeles Council of Skin-diving Clubs, met with Baxter to discuss a black sea bass questionnaire for skindivers.
- Mar. 8 - Roedel, Fitch and Clemens met with Messrs. Crowther, Howard and Johnson, U.S. Bureau of Commercial Fisheries, at CSFL to discuss plans for tuna research in the coming months. Relationships between the Bureau and ourselves are most cordial, and we anticipate maximum results from the integrated programs we are conducting.
- Mar. 9 - Mr. J. Sanderson of the Attorney General's office and John Skinner of Water Projects met with Orcutt and Aplin to discuss procedures of Public Utilities Commission Hearing of March 10 on matters of Morro Bay steam plant.
- Mar. 10 - Aplin attended a formal hearing held in San Francisco to consider the application of Pacific Gas and Electric Company to enlarge the cooling water flow of their Morro Bay steam plant. An extensive study of amount of water heating in the area was presented by Dr. Ernest Salo of Humboldt State College, consultant of the electric company. Since there was no indication that the plant enlargement would harm the local marine fish or clams, the permit was granted.
- Mar. 10 - Turner spoke to 250-300 members of a Long Beach skin diving club, the Squid Diddlers.

- Mar. 13 - Turner spoke to 35-40 divers and interested persons in Santa Barbara.
- Mar. 13 - Mrs. Powell attended a special Library Association meeting held at the College of Osteopathic Physicians and Surgeons, Los Angeles.
- Mar. 15 - Radovich presented a talk at the Oceanic Fish Protective Association Meeting held in Compton. He discussed water temperatures, fish and currents.
- Mar. 17 - Orcutt attended the Sacramento meeting of Regional Managers and Branch Chiefs. He reported on the Oyster Disease Meeting held at the Virginia State Fisheries Laboratory, Jan. 30 and 31.
- Mar. 19 - Fitch gave a talk on collecting in the Gulf of California illustrated with kodachrome slides, to 27 members and guests of the Pacific Shell Club (Los Angeles).
- Mar. 21 - Young delivered a talk on sea lions to a meeting of the Newport Spin Club. Approximately 50 people were present.
- Mar. 21-23- Daugherty and Blunt attended a scale reading session at La Jolla.
- Mar. 21 - Roedel, Greenhood, Orcutt and Best met at Stanford to discuss means of sampling and reporting mink food landings. A plan meeting the needs of both Biostatistics and Bottomfish Investigations was developed.
- Mar. 21 - Radovich participated in a Cal COFI meeting at La Jolla.
- Mar. 22 - Roedel and Croker met in San Francisco to consider current program needs of Branch and Operations.
- Mar. 23 - Paul spoke on marine biology to a group of Tustin High School students. About 35 were present.
- Mar. 22-24- Dan Miller participated in the Pacific Fishery Biologists meeting at Harrison Hot Springs, British Columbia.
- Mar. 27 - Baxter and Mackett met with Aplin to discuss seismic operations preliminary to transferring responsibility for current activities to the northern California Special Projects section.
- Mar. 27-29- Orcutt, Best, Young and Cox attended the PMFC research staff meeting in Portland.

B. Visitors:

- Mar. 2 - Mr. Clinton Dawes, an algologist from UCLA accompanied the divers to the Malibu reef and helped identify several of the algae found there.
- Mar. 9 - Mr. Gilbert Grau, specialist in the mollusk family Pectinidae, spent a couple of hours at CSFL discussing problems he was having procuring specimens for his studies.
- Mar. 18 - John Prescott, Curator, Marineland of the Pacific, visited several staff members at CSFL to obtain information regarding our work for a career-day talk he was going to give.

C. Personnel Changes:

- Mar. 2 - Betty J. Murphy appointed Intermediate Clerk.
- Mar. 2 - Marguerite M. Jordan, Intermediate Account Clerk, transferred to Terminal Island from Region 3.
- Mar. 3 - Jane M. Solaro, Senior Stenographer, resigned.
- Mar. 13 - Eunice L. LoVerde appointed Intermediate Typist Clerk.
- Mar. 17 - William H. Beckett transferred to Region 3.
- Mar. 20 - John L. Milton appointed Intermediate Account Clerk.
- Mar. 22 - Rita Short, Accounting Tabulating Machine Supervisor I (IBM) retired on disability retirement after serving ten years with the Department. Much of the progress of the Biostatistical unit can be attributed to her efforts and her services will be missed.



Phil M. Roedel
Marine Resources Manager

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